

# FOOD SCIENCE AND TECHNOLOGY

## **Purpose**

*The Food Science and Technology Career Development Event is designed to promote learning activities in food science and technology related to the food industry and to assist students in developing practical knowledge of principles used in a team decision-making process.*

## **Objectives**

**The Food Science and Technology Career Development Event provides the opportunity for the participant to:**

- I. Gain an awareness of career and professional opportunities in the field of food science and technology.
- II. Experience group participation and leadership responsibilities in a competitive food science and technology program.
- III. Develop technical competence and personal initiative in a food science and technology occupation.

## Event Rules

Team make-up: The team will consist of four members with the TOP 3 members' scores being totaled for the team score. Top 3 individual scores will be used to determine which teams advance to Team Activity. All team members will participate in the Team Activity. Final team scores will be based on Top 3 Individual scores and Team Activity scores.

1. Official FFA dress is required for all participants. A 10% penalty will be assessed per individual not in FFA official dress as identified in the current edition of the FFA Manual. All contestants in the FFA Leadership Development Events must wear Official FFA Dress, as identified in the current FFA Manual. Members may also wear black boots instead of shoes. Members will be checked for Official Dress by physical sight by the judge while the member is standing vertically at the time of check in.
2. Participants will use Scantron Food Science (713-3) from:  
<https://www.judgingcard.com/ScanSheets/samples/713-3-FoodSci.pdf>
3. Teams and/or individuals will not be permitted to use electronic media during the event, unless provided by the CDE Superintendent.
  - **This includes but is not limited to cell phones, mp3 players, cameras, etc.**
  - **Any participant in possession of an unauthorized electronic device, except a calculator, in the event area is subject to disqualification.**
4. Allergy Information: Food products used in this event may contain or come in contact with potential allergens. Advisors must submit a special needs request for participants with any allergies. The event committee will make all reasonable efforts to accommodate students with food allergies.
5. Each participant must provide:  
A clipboard that is clean and free of notes.  
Two sharpened No. 2 pencils.

## Event Format

The Food Science and Technology CDE is comprised of the following components:

### A. Individual Activities:

1. Written Exam
2. Problem Solving/Math Practicum
3. Food Safety Practicums
  - a. Safety/Sanitation Practicum
  - b. Customer Inquiry Practicum
4. Sensory Evaluation Practicums
  - a. Triangle Tests
  - b. Aroma Identification

### B. Team Activity

C. Setting Up the event: It is recommended that the teams be divided into two groups for the individual activities. One group will complete the Written Exam, Math Problem Solving, and Customer Inquiry (60 Minutes). The other group will complete the Safety/Sanitation Practicum (2 minutes/sample), Aroma Identification (60 seconds per sample), Triangle Test (60 seconds per sample). After the 60 minutes, the groups should switch. Teammates should not interact with each other during the Individual Activities portions and should be arranged so they are not at the same stations at the same time.

### State Event Schedule

| Group A              | Group B                     |
|----------------------|-----------------------------|
| Written Exam         | Safety/Sanitation Practicum |
| Math Problem Solving | Aroma Identification        |
| Customer Inquiry     | Triangle Test               |

**Break for Tabulation – 11am** – Students may leave the contest area for lunch while individual scores are tabulated.

**By Noon** - Results will be posted to [judgincard.com](http://judgincard.com) for teams advancing to finals round.

**1pm** – Top eight teams will reconvene at Eckles Hall for team activity portion. Once students check into the contest area, they must remain until it is their time to present for the team activity.

Each of the components are described below:

## **A. INDIVIDUAL ACTIVITIES:**

### **1. Written Exam:** (150 points possible per individual)

The objective questions administered during the food science and technology examination will be designed to determine each team member's understanding of the basic principles of food science and technology. The test will be 60% listed from past National FFA Exams since and including 2000. The remaining 40% will come from the *Principle of Food Science*, 4<sup>th</sup> edition.

Team members will work individually to answer each of the 50 questions. Each person will have 60 minutes to complete the examination. Each question will be worth three points, for a total of 150 points.

### **2. PROBLEM SOLVING/ MATH PRACTICUM:** (25 Points Possible per individual)

Participants will answer a series of five mathematical calculations based on common food science themes. Questions may include nutrition calculations, ingredient quantity, cost benefit analysis, estimation of cost/margin of goods sold, conversions, processing conditions, etc.

Example Question. The perfect glass of sweet tea is 20 percent sugar. Jim is making a one-gallon container of sweet tea. How many cups of sugar should he add?

- a. 2.4 cups
- b. 3.2 cups
- c. 3.4 cups
- d. 4 cups

## **3. FOOD SAFETY PRACTICUMS**

### **a. Safety/Sanitation Practicum** ( 25 points per individual)

Team members will work individually to evaluate five (5) photos. The contestant will evaluate the situations presented and select from a list of possible misuses of GMP's and HACCP.

### **b. Customer Inquiry Practicum** (25 points per individual)

Each participant will be given five scenarios representing general consumer inquiries. Participants must determine if the consumer inquiry reflects a quality or safety issue (two points per scenario) and determine if it is a biological, chemical or physical concern or hazard (three

points per scenario). Each Customer Inquiry is worth five points each for a total of twenty-five points.

#### 4. SENSORY EVALUATION PRACTICUMS

**a. Triangle Tests:** (20 points per individual)

Five different triangle tests will be conducted. Participants are expected to identify the different samples through flavor, aroma, visual cues and/or textural differences. Answers will be given on the sheet provided. No list will be provided for this segment of the practicum. Each triangle test is worth five points. (20 points)

**b. Aromas** (50 points per individual)

Each participant will be asked to identify ten different aromas from vials provided at each station and record the answer on the sheet provided. A list of potential aromas will be provided to each person. Each sample is worth 5 points. (50 points) Participants are NOT allowed to have a ‘nasal cleanse’ or smell anything in between the aroma samples.

|     |           |  |     |                  |  |     |                |
|-----|-----------|--|-----|------------------|--|-----|----------------|
| 10. | Apple     |  | 21. | Ginger           |  | 32. | Peach          |
| 11. | Banana    |  | 22. | Grape            |  | 33. | Peppermint     |
| 12. | Basil     |  | 23. | Lemon            |  | 34. | Raspberry      |
| 13. | Butter    |  | 24. | Licorice (anise) |  | 35. | Sage           |
| 14. | Cherry    |  | 25. | Lime             |  | 36. | Smoke (liquid) |
| 15. | Chocolate |  | 26. | Maple            |  | 37. | Strawberry     |
| 16. | Cinnamon  |  | 27. | Molasses         |  | 38. | Vanilla        |
| 17. | Clove     |  | 28. | Nutmeg           |  | 39. | Watermelon     |
| 18. | Coconut   |  | 29. | Onion            |  | 40. | Wintergreen    |
| 19. | Coffee    |  | 30. | Orange           |  |     |                |
| 20. | Garlic    |  | 31. | Oregano          |  |     |                |

#### B.TEAM ACTIVITY

##### TEAM PRODUCT DEVELOPMENT PROJECT (400 POINTS POSSIBLE PER TEAM)

At the completion of the Individual Practicums, team scores will be calculated and the Top eight (8) teams will advance to participate in the Team Product Development Project. The teams will draw for order of presentations.

Each team will receive a product development scenario describing the need for a new or redesigned product that appeals to a potential market segment. The team’s task will be to design

a new food product or reformulate an existing product based on information contained within the product development scenario.

Each team will be provided with packaging materials, ingredients and necessary ingredient information in order to develop, label and package a product. The following supplies must be provided to each team:

- 2 Sheets of 22" x 28" posterboard
- Notecards
- White paper
- Markers
- Ruler
- Large Eraser
- Easels in the presentation room

The team will have 60 minutes to respond to the product development scenario and reformulate or develop a product, calculate a nutritional label, develop the ingredient statement and information panel and develop the front or principle display panel to reflect the new product.

The team will be responsible for understanding and using the following concepts to develop a presentation addressing the following:

Cost of goods sold

Nutrition

Target audience

Quality control

Marketing and sales

Product

Processing

Packaging

Food safety

Formulation concepts

Quality of presentation

After this time period, each team member will contribute to a ten (10) minute oral presentation delivered to a panel of judges. No electronic media will be used in the presentation.

| Categories  | Platforms      | Markets (Domestic & International) |
|-------------|----------------|------------------------------------|
| Cereal      | Frozen         | Retail                             |
| Snacks      | Refrigerated   | Wholesale                          |
| Meals       | Shelf-stable   | Food Service                       |
| Side Dishes | Convenience    | Convenience Store                  |
| Beverages   | Ready to eat   |                                    |
| Supplements | Heat and serve |                                    |
| Condiments  |                |                                    |
| Desserts    |                |                                    |

Following the presentation there will be a five (5) minute question and answer period with the judges in which each team member is expected to contribute. All materials will be collected after the presentation.

Total time involved for each team will be 75 minutes. Total number of points possible for this activity will be 400 points.

Product development scenarios will describe a category, platform and market. These may include but are not limited to the following categories, platforms and markets listed below. Deadline for letting teachers know is February 1. State CDE Superintendent will email all teachers the list of which category, platform and market will be used at the State CDE Event by February 1. Evaluation criteria and points for team product development activity can be found on the team product development scorecard.

### **2020 Product Info: Condiment, Shelf-stable and Retail**

#### **Example of scenario product from past events:**

| Category  | Platform         | Market            | Actual Product                    |
|-----------|------------------|-------------------|-----------------------------------|
| Side Dish | Ready to Prepare | Retail or big box | Whole grain, low sodium side dish |
| Beverage  | Shelf-stable     | Retail            | Shelf-stable specialty coffee     |
| Side dish | Refrigerated     | Retail            | Side salad for baby boomers       |
| Snack     | Shelf-stable     | Retail            | Non-nut snack bar                 |
| Breakfast | Ready to eat     | Retail            | Single serve cereal for kids      |

### Event Scoring

| ACTIVITIES                       | Individual Points | Team Points |
|----------------------------------|-------------------|-------------|
| Team Product Development Project |                   | 400         |
|                                  |                   |             |
| Written Exam                     | 150               | 450         |
| Math/Problem Solving             | 25                | 75          |
| Food Safety and Quality          | 50                | 150         |
| Sensory Evaluation               | 70                | 210         |
|                                  |                   |             |
| MAXIMUM POINTS                   | 295               | 1285        |

### TIEBREAKERS

#### TEAM:

1. Team Product Development
2. Individual Test (combined score)
3. Team Food Safety/Sanitation (combined score)

#### INDIVIDUAL:

1. Written Exam
2. Food Safety and Quality
3. Sensory Evaluation



## References

The following list contains references that may prove helpful during event preparation. The most current edition of resources will be used.

Past CDE materials and other resources available by logging in to [FFA.org](#)

### EXAM REFERENCES

- **60%** of the Exam shall come from past National FFA Food Science tests currently available on FFA.org.
- Principles of Food Science, 4th edition, 2015, Janet Ward and Larry Ward, The Goodheart-Willcox Company, INC.

### GENERAL TRAINING REFERENCES

- Principles of Food Sanitation, 5th Edition, 2006, Norman G. Marriott and Robert B. Gravani, Springer Science + Business Media, Inc.
- Institute of Food Technology website, <http://www.ift.org>
- USDA Food Safety and Inspection Service website, <http://www.fsis.usda.gov>
- US Food and Drug Administration, [www.FDA.org](http://www.FDA.org) \*
- Penn State Kitchen Chemistry: Experiments, resources and materials for educators and students, <http://foodscience.psu.edu/public/kitchen-chemistry>
- Food Safety Education, [http://www.fsis.usda.gov/food\\_safety\\_education/for\\_kids\\_&\\_teens/index.asp](http://www.fsis.usda.gov/food_safety_education/for_kids_&_teens/index.asp)
- Partnership for Food Safety Education, <http://www.fightbac.org>
- FoodSafety.gov, <http://www.foodsafety.gov>

## Forms

See Team Product Development Scorecard and Customer Inquiry Rubric below.

# Team Product Development Project Scorecard

400 points

| CHAPTER  | STATE | TEAM NUMBER    |            |
|--|-------|----------------|------------|
|  |       | Possible Score | Team Score |
| Package Display Components                                 |       |                |            |
| Use and development of nutrition label                     |       |                |            |
| • Required information present                             | 10    |                |            |
| • Correct calculations                                     | 10    |                |            |
| • Correct organization                                     | 10    |                |            |
| Use and development of the ingredient statement            |       |                |            |
| • Present  | 10    |                |            |
| • Correct order and all ingredients included               | 10    |                |            |
| • Location on package                                      | 10    |                |            |
| Use of principle display panel to convey information       |       |                |            |
| • All required components                                  | 15    |                |            |
| • Correct information                                      | 15    |                |            |
| • Location on package                                      | 10    |                |            |
| PACKAGE DESIGN SUBTOTAL                                    |       | 100            |            |
| Product Development Oral Presentation                      |       |                |            |
| Cost of goods sold   |       |                |            |
| • Costing  | 20    |                |            |
| • Accuracy   |       |                |            |
| Nutrition  |       |                |            |
| • Communicate nutritional quality of product               | 20    |                |            |
| • Apply nutritional quality to health benefits             |       |                |            |
| Target audience  |       |                |            |
| • Identification of key consumer                           | 20    |                |            |
| Quality control  |       |                |            |
| • Key quality attribute of consistent product              | 20    |                |            |
| • Examples: flavor, color, texture, net weight, size, etc. |       |                |            |
| Marketing and sales  |       |                |            |
| • Communicated with future users                           | 20    |                |            |
| • Promotions   |       |                |            |
| • Market location  |       |                |            |
| Product  | 20    |                |            |



|  |            |  |
|--|------------|--|
| <ul style="list-style-type: none"> <li>• Appearance</li> <li>• Texture</li> <li>• Shelf-life</li> <li>• Interaction of ingredients</li> <li>• Creativity</li> </ul>                      |            |  |
| <b>Processing</b> <ul style="list-style-type: none"> <li>• Description of how to make product</li> <li>• Equipment</li> <li>• Flow diagram, unit operations</li> <li>• People</li> </ul> | 20         |  |
| <b>Packaging</b> <ul style="list-style-type: none"> <li>• Materials used</li> <li>• Appropriate for use of product</li> <li>• Creativity</li> </ul>                                      | 20         |  |
| <b>Food Safety</b> <ul style="list-style-type: none"> <li>• Discussed potential hazards/concerns associated with products</li> </ul>   | 20         |  |
| <b>Formulation Concepts</b>  |            |  |
| • How well did product match concept/product development scenario  | 30         |  |
| • Category   | 5          |  |
| • Platform   | 5          |  |
| <b>Quality of Presentation</b>   |            |  |
| • Equitable participation of team members  | 5          |  |
| • Organization   | 5          |  |
| • Use of time allowed  | 5          |  |
| • Professionalism  | 5          |  |
| • Presence & enthusiasm  | 5          |  |
| • Mannerisms   | 5          |  |
| <b>Product Development Oral Presentation Subtotal</b>  | <b>250</b> |  |
| <b>Response to Judges' Questions</b>   |            |  |
| <b>Team Participation in Question Response</b> <ul style="list-style-type: none"> <li>• All team members contributed</li> </ul>  | 25         |  |
| <b>Quality of Response</b><br>Accuracy<br>Ability to answer<br>Originality<br>Knowledge  | 25         |  |
| <b>Response to Judges' Questions Subtotal</b>  | <b>50</b>  |  |
| <b>TOTAL POINTS</b>  | <b>400</b> |  |

## Customer Inquiry Rubric (25 points)

|   | Points Possible | Points Earned |
|---|-----------------|---------------|
| <b>Scenario # 1:</b> This issue represented in this scenario is a:<br><input type="checkbox"/> Food Quality Issue <input type="checkbox"/> Food Safety Issue                | 2               |               |
| Is the concern or hazard primarily ( <i>Check only one</i> ):<br><input type="checkbox"/> Biological <input type="checkbox"/> Physical<br><input type="checkbox"/> Chemical | 3               |               |
| <b>Scenario # 2:</b> This issue represented in this scenario is a:<br><input type="checkbox"/> Food Quality Issue <input type="checkbox"/> Food Safety Issue                | 2               |               |
| Is the concern or hazard primarily ( <i>Check only one</i> ):<br><input type="checkbox"/> Biological <input type="checkbox"/> Physical<br><input type="checkbox"/> Chemical | 3               |               |
| <b>Scenario # 3:</b> This issue represented in this scenario is a:<br><input type="checkbox"/> Food Quality Issue <input type="checkbox"/> Food Safety Issue                | 2               |               |
| Is the concern or hazard primarily ( <i>Check only one</i> ):<br><input type="checkbox"/> Biological <input type="checkbox"/> Physical<br><input type="checkbox"/> Chemical | 3               |               |
| <b>Scenario # 4:</b> This issue represented in this scenario is a:<br><input type="checkbox"/> Food Quality Issue <input type="checkbox"/> Food Safety Issue                | 2               |               |
| Is the concern or hazard primarily ( <i>Check only one</i> ):<br><input type="checkbox"/> Biological <input type="checkbox"/> Physical<br><input type="checkbox"/> Chemical | 3               |               |
| <b>Scenario # 5:</b> This issue represented in this scenario is a:<br><input type="checkbox"/> Food Quality Issue <input type="checkbox"/> Food Safety Issue                | 2               |               |
| Is the concern or hazard primarily ( <i>Check only one</i> ):<br><input type="checkbox"/> Biological <input type="checkbox"/> Physical<br><input type="checkbox"/> Chemical | 3               |               |
| <b>TOTAL</b>  | <b>25</b>       |               |